UNITED STATES PATENT AND TRADEMARK OFFICE

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/759,962	01/12/2001	Jawahar M. Gidwani	22122878-temp	1684

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EXAMINER
PHAM, THOMAS K

ART UNIT	PAPER NUMBER
2121	6

DATE MAILED: 05/05/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

PTO-90C (Rev. 10/03)

| **Office Action Summary** | Application No. 09/759,962 | **Applicant(s)** GIDWANI, JAWAHAR M. |
| | **Examiner** Thomas K Pham | **Art Unit** 2121 |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE <u>3</u> MONTH(S) FROM
THE MAILING DATE OF THIS COMMUNICATION.
- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed
  after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
  Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any
  earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *13 January 2001*.
2a)☐ This action is **FINAL**.   2b)☒ This action is non-final.
3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is
    closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-22* is/are pending in the application.
     4a) Of the above claim(s) _____ is/are withdrawn from consideration.
5)☐ Claim(s) _____ is/are allowed.
6)☒ Claim(s) *1-22* is/are rejected.
7)☐ Claim(s) _____ is/are objected to.
8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.
10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.
     Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
     Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
     a)☐ All   b)☐ Some * c)☐ None of:
       1.☐ Certified copies of the priority documents have been received.
       2.☐ Certified copies of the priority documents have been received in Application No. _____.
       3.☐ Copies of the certified copies of the priority documents have been received in this National Stage
           application from the International Bureau (PCT Rule 17.2(a)).
     * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1)☒ Notice of References Cited (PTO-892)
2)☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3)☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
    Paper No(s)/Mail Date <u>5</u>.

4)☐ Interview Summary (PTO-413)
    Paper No(s)/Mail Date. _____ .
5)☐ Notice of Informal Patent Application (PTO-152)
6)☐ Other: _____.

First Action on the Merits

1.   Claims 1-22 of U.S. Application 09/759,962 filed on 01/13/2001 are presented for

examination.

Quotations of U.S. Code Title 35

2.   The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the

basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

3.   The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all

obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claim Rejections - 35 USC § 102

4.   Claims 1, and 5-9 are rejected under 35 U.S.C. 102(b) as being anticipated by U.S. Patent

No. 5,388,056 ("Horiuchi").

Regarding claim 1

Horiuchi teaches a computer-implemented method for analyzing a structure comprising:

- receiving linear elastic input data of a structure (col. 6 lines 45-53, "Data of the structure

  10 ... control the actuators 3a and 3b, respectively");

- automatically determining non-linear input data based on the received linear elastic input

  data (col. 6 lines 61-68, "The digital computer 5 ... to as "numerical model")");

- analyzing the determined non-linear input data through a non-linear analysis technique

  (col. 7 line 3 to col. 9 line 31, "Among the object structure 1 ... the velocity and

  acceleration") ; and

- outputting the result of analysis (col. 13 lines 51-55, "FIG. 21 shows ... via the D/A

  converter 6").

Regarding claim 5

Horiuchi teaches analyzing includes using a minimization technique to minimize the storage

requirements of a global stiffness matrix and local stiffness matrix (col. 7 lines 16-17, "K: a

stiffness matrix of the numerical model 10").

Regarding claim 6

Horiuchi teaches analyzing includes using a numerical solution technique that requires only one

copy of a global stiffness matrix (col. 7 lines 17-22, "f: an external force ... differentiated value

in time").

Regarding claim 7

Horiuchi teaches reformulating and reducing only a portion of a global stiffness matrix that

changes due to change in member state or large displacement effects (col. 10 lines 25-34, "FIG.

7 shows a typical ... is determined").

Regarding claim 8

Horiuchi teaches analyzing includes using a sufficiently higher order integration method to
increase the step size thereby reducing the number of steps required for analysis (col. 8 lines 9-
14, "In order to execute … this accurate measurement").

Regarding claim 9

Horiuchi teaches analyzing includes: using a minimization technique to minimize the storage
requirements of a global stiffness matrix and local stiffness matrix (col. 7 lines 16-17, "K: a
stiffness matrix of the numerical model 10"); using a numerical solution technique that requires
only one copy of the global stiffness matrix (col. 7 lines 17-22, "f: an external force …
differentiated value in time"); reformulating and reducing only a portion of a global stiffness
matrix that changes due to change in member state (col. 10 lines 25-34, "FIG. 7 shows a typical
… is determined"); and using a sufficiently higher order integration method to increase the step
size thereby reducing the number of steps required for analysis (col. 8 lines 9-14, "In order to
execute … this accurate measurement").

5.   Claim 16 is rejected under 35 U.S.C. 102(b) as being anticipated by U.S. Patent No.
5,842,148 ("Prendergast").

Regarding claim 16

Prendergast teaches a computer-implemented method for analyzing a structure comprising:

-      classifying a plurality of structures according to predetermined structure types, sub-
       classifying the structures within each classified structure type by fundamental structure
       periods ((col. 2 lines 4-8, "a method for … earthquake or wind forces");

- determining damage functions for the sub-classified structures (col. 6 lines 59-65, "After

    the analysis ... for any given rating"); and

- storing the determined damage functions (col. 2 lines 29-34, "This data is input ... the

    structure is located").

Claim Rejections - 35 USC § 103

6.   Claims 2-4, 10-13 are rejected under 35 U.S.C. 103(a) as being unpatentable over

Horiuchi in view of U.S. Patent No. 6,412,237 ("Sahai").

Regarding claim 2

Horiuchi teaches a computer-implemented method for analyzing a structure but does not teach

determining a static load pushover profile for use in a static load pushover analysis. However,

Sahai teaches determining a static load pushover profile for use in a static load pushover analysis

(col. 10 col. 1-10, "Specific analyses include ... of the earthquake criteria"). Therefore, it would

have been obvious to one of ordinary skill in the art at the time the invention to incorporate the

Static Pushover analysis of Sahai with the computer method of Horiuchi because it would

provide for clearly depicting step by step the behavior of the inelastic response of the frame.

Regarding claim 3

Horiuchi teaches automatically determining non-linear input data but does not include

automatically determining the envelope behavior, degradation behavior, and failure behavior of

members of the structure based on previously determined models of the members and the

received linear elastic input data. However, Sahai teaches using standard commercial software

programs for automatically determining the deflections, stresses, elastic behavior in the structural

frame based on previous models (col. 9 line 63 to col. 10 line 10). Therefore, it would have been

obvious to one of ordinary skill in the art at the time the invention to incorporate the automatic

computer analysis of Sahai with the computer method of Horiuchi because it would provide for

clearly depicting step by step the behavior of the inelastic response of the frame.

Regarding claim 4

Horiuchi teaches at least a part of the data for the previously determined models is based on

experimental or empirical data, and each model is stored as a plurality of data points, a

mathematical representation, or both (col. 4 lines 21-31, "Effective evaluation of the results ...

after completion of the test").

Regarding claim 10

Sahai teaches displaying a summary of inelastic sequence of events for damaged members of the

structure (col. 13 lines 51-55, "FIG. 21 shows ... via the D/A converter 6").

Regarding claim 11

Sahai teaches the summary includes global, regional, and local damage measures (table 1).

Regarding claim 12

Sahai teaches the global damage measure includes global displacement ductility and number of

damaged members, the regional damage measure includes one or more of inter-story drifts, inter-

story shears, number of damaged members in the region, and identification of damaged

members, and the local damage measure includes maximum member ductilties, cumulative

member ductlities and number of cycle reversals (col. 11 lines 6-30, "While the frame is ... other

3% damping").

Regarding claim 13

Horiuchi and Sahai do not teach outputting includes outputting a color-coded image of the

structure showing different levels of damage to the members of the structure. However, it would

have been obvious to one of ordinary skill in the art at the time the invention that color-coding

them identifies different levels of damages much easier, as it is known in the art of blue print and

building design.

7.   Claims 17-22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Prendergast

in view of Sahai.

Regarding claim 17

Sahai teaches determining non-structural damage functions corresponding to the structural

damage functions (col. 11 lines 25-30, "Generally this is ... the other 3% damping").

Regarding claim 18

Sahai teaches classifying the plurality of structures according to either FEMA guidelines or

building code guidelines (col. 11 lines 15-17, "for the structure ... document FEMA-273").

Regarding claim 19

Prendergast teaches sub-classifying as similar structures all structures within a classified

structure type whose fundamental structure period falls within a predetermined range (col. 3 lines

57-62, "The structural characteristics ... associated with damage").

Regarding claim 20

Prendergast teaches receiving location and other data of a first structure, identifying among the

plurality of classified structures one classified structure that corresponds to the first structure, and

retrieving the stored damage function of a sub-classified structure that corresponds to the

identified structure for analysis of the first structure (col. 6 lines 16-56, "Wood frame, one to ...

and/or wind database 36").

Regarding claim 21

Prendergast teaches determining a fault that likely causes damage to the first structure,

determining at least one spectral acceleration of the determined fault line to the structure, and

determining a damage measure for the determined spectral acceleration from the retrieved

damage function (col. 5 line 62 to col. 6 line 16, "It is generally accepted ... when evaluating

risk").

Regarding claim 22

Prendergast teaches determining damage functions of a plurality of previous disasters; and

calculating a mean damage function from the determined damage functions by regression (col. 6

lines 25-28, "Damage to a specific ... in the past").

8.   Claims 14-15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Horiuchi in

view of U.S. Patent No. 5,842,148 ("Prendergast").

Regarding claim 14

Horiuchi teaches a computer-implemented method for analyzing a structure but does not teach

repeating the analyzing step for each of a plurality of intensities or probabilities of a preselected

catastrophic load; and displaying the number of damage measures as a function of the intensities

or probabilities of the preselected catastrophic load. However, Prendergast teaches a probabilistic

program is used to evaluate a number of parameters in determining the relative risk of damage to

the structure (col. 5 lines 47-60, "USQUAKE, and similar ... for a wind related analysis").

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention

to incorporate the probabilistic analysis of Prendergast with the computer method of Horiuchi

because it would provide for estimating the damages caused to the structure and how similar

structures performed in the past.

Regarding claim 15

Prendergast teaches using the damage measures to assess monetary losses or to make a financial

or mitigation decision (col. 6 line 66 to col. 7 line 2, "The rating and report ... lower insurance

rates").

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should
be directed to examiner *Thomas Pham*; whose telephone number is (703) 305-7587 and fax number is
(703) 746-8874, Monday-Thursday and every other Friday from 7:30AM- 5:00PM EST or contact
Supervisor *Mr. Anthony Knight* at *(703) 308-3179*.

Any response to this office action should be mailed to: **Director of Patents and
Trademarks Washington, D.C. 20231**, or **Hand-delivered** responses should be brought to
**Crystal Park II, 2121 Crystal Drive Arlington, Virginia, (Receptionist located on the 4th
floor)**, or fax to the **official fax number (703) 872- 9306.**

Any inquiry of a general nature or relating to the status of this application should be directed to
the Group receptionist whose telephone number is (703) 305-3900.

Thomas Pham
Patent Examiner

TP

May 1, 2004

Anthony Knight
Supervisory Patent Examiner
Group 3600